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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/469,190	12/21/1999	KATSUHIKO HIEDA	04329.2210	4681

22852 7590 03/27/2002

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EXAMINER

VU, HUNG K

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 03/27/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/469,190	HIEDA ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Hung K. Vu	2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 14 January 2002.
- 2a) ☒ This action is FINAL.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) 1-9, 11-13 and 16-23 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 10, 14, 15 and 24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
     If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \*    c) ☐ None of:  
         1. ☐ Certified copies of the priority documents have been received.  
         2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
         3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
     \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
     a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                  | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Response to Amendment*

1. Amended claim 19, which is now belong to nonelected species, is withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Invention, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 9.

### *Claim Objections*

2. Claims 10 and 14 are objected to because of the following informalities:

In claim 10, line 7, “dielectric” should be changed to “insulating” for clarity.

In claim 14, lines 3-4, “the insulating” should be changed to “the capacitor insulating” for clarity.

Appropriate correction is required.

### *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 10, 15, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kashiara et al. (PN 5,567,964, of record) in view of Nishioka (PN 5,635,420).

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Kashihara et al. discloses a semiconductor device comprising,

A semiconductor substrate (31);

A conductive plug (43a) formed on the semiconductor substrate;

A lower electrode (1) formed in contact with the conductor plug;

A capacitor insulating film (11a) formed on a side of the lower electrode;

An upper electrode (5) formed above the lower electrode via the capacitor insulating

film,. Note Figures 1, 11-14, 18, and 24 of Kashihara et al..

Kashihara et al. discloses all of the claimed limitations except the lower electrode constituted by a plurality of crystal grains, wherein the crystal grains containing a metallic element, and a grain boundary between adjacent two of the plurality of crystal grains being substantially perpendicular to an interface between the lower electrode and the capacitor insulating film.

However, Nishioka discloses a lower electrode (4) constituted by a plurality of crystal grains, wherein the crystal grains containing a metallic element (Pt), and a grain boundary between adjacent two of the plurality of crystal grains being substantially perpendicular to an interface between the lower electrode and a capacitor insulating film (5). Note Figures 1-19 of Nishioka.

Therefore, it would have been obvious to one of ordinary skill in the art to form the lower electrode of Kashihara et al. having a plurality of metallic crystal grains, such as taught by Nishioka in order to increase the surface areas of the lower electrode and to reduce the leakage current.

With regard to claim 15, Kashihara et al. and Nishioka disclose the capacitor insulating film (3) is also formed on the top surface of the lower electrode (1), the capacitor insulating film on the

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top surface of the capacitor lower electrode being thicker than that (11a) on the side of the lower electrode.

With regard to claim 24, Kashiwara et al. and Nishioka disclose the lower electrode is used as a memory cell of a stack-type DRAM.

4. Claim 10, 14, 15, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamichi et al. (PN 5,943,547) in view of Nishioka (PN 5,635,420).

Yamamichi et al. discloses a semiconductor device comprising,

A semiconductor substrate (1);

A conductive plug (3) formed on the semiconductor substrate;

A lower electrode (5) formed in contact with the conductor plug;

A capacitor insulating film (6) formed on a side of the lower electrode;

An upper electrode (7) formed above the lower electrode via the capacitor insulating film.

Note Figures 1-40E of Yamamichi et al..

Yamamichi et al. discloses all of the claimed limitations except the lower electrode constituted by a plurality of crystal grains, wherein the crystal grains containing a metallic element, and a grain boundary between adjacent two of the plurality of crystal grains being substantially perpendicular to an interface between the lower electrode and the capacitor insulating film.

However, Nishioka discloses a lower electrode (4) constituted by a plurality of crystal grains, wherein the crystal grains containing a metallic element (Pt), and a grain boundary between adjacent two of the plurality of crystal grains being substantially perpendicular to an interface

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between the lower electrode and a capacitor insulating film (5). Note Figures 1-19 of Nishioka. Therefore, it would have been obvious to one of ordinary skill in the art to form the lower electrode of Yamamichi et al. having a plurality of metallic crystal grains, such as taught by Nishioka in order to increase the surface areas of the lower electrode and to reduce the leakage current.

With regard to claim 14, Yamamichi et al. and Nishioka disclose a lower end portion of the lower electrode is covered by an insulating film (8) different from the capacitor insulating film (6).

With regard to claim 15, Yamamichi et al. and Nishioka disclose the capacitor insulating film (6) is also formed on the top surface of the lower electrode (5), the capacitor insulating film on the top surface of the capacitor lower electrode being thicker than that on the side of the lower electrode.

With regard to claim 24, Yamamichi et al. and Nishioka disclose the lower electrode is used as a memory cell of a stack-type DRAM.

### ***Response to Arguments***

5. Applicant's arguments with respect to claim 10 have been considered but are moot in view of the new ground(s) of rejection.

*Conclusion*

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung K. Vu whose telephone number is (703) 308-4079. The examiner can normally be reached on Mon-Thurs 7:00-5:30, Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

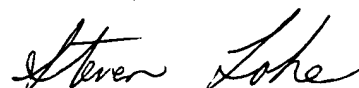
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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Vu

March 20, 2002

Steven Locke  
Primary Examiner

A handwritten signature in cursive script that reads "Steven Locke".